

CLAIMS

1. A method of forward link power control in a wireless
2 communications system comprising:
selecting a power controlled forward link signal;
4 calculating a bit error rate for the selected signal;
calculating a variance for the selected signal; and
6 calculating a forward link power control set point from the bit
error rate and the variance.
2. The method of claim 1 wherein the selected signal is the forward
2 link power control sub-channel.
3. The method of claim 1 further comprising calculating the average
2 number of fingers in lock and further calculating a forward link power control
set point from the number of fingers in lock.
4. A wireless communications receiver comprising:
2 means for selecting a power controlled forward link signal;
means for calculating a bit error rate for the selected signal;
4 means for calculating a variance for the selected signal; and
means for calculating a forward link power control set point from
6 the bit error rate and the variance.
5. The wireless communications receiver of claim 4 further
2 comprising means for calculating an average number of fingers in lock.

6. The wireless communications receiver of claim 4 wherein the
2 means for selecting a signal selects a forward link power control sub-channel
signal.

7. The wireless communications receiver of claim 4 wherein the
2 receiver comprises a subscriber unit.

8. A wireless communications receiver comprising:
2 a selector for selecting a power controlled forward link signal;
a calculator for calculating a bit error rate for the selected signal;
4 a variance calculator for calculating a variance for the selected
signal; and
6 a calculator for calculating a forward link power control set point
from the bit error rate and the variance.

9. The wireless communications receiver of claim 8 wherein the
2 selector for selecting a signal selects a forward link power control sub-channel
signal.

10. The wireless communications receiver of claim 8 further
2 comprising a lock detector for calculating an average number of fingers in lock.

11. An apparatus for generating forward link closed loop power
2 commands comprising:
a signal demodulator for demodulating a selected forward link
4 power controlled signal;
a signal energy calculator for calculating the energy of the
6 selected signal;
a lock detector for detecting the number of receiver fingers in
8 lock;

a signal variance calculator for determining the variance of the
10 selected signal; and
a setpoint calculator for determining a forward link power control
12 setpoint.

12. Apparatus for determining a forward link power control set
2 point, comprising:

a calculator for calculating a selected forward link signal bit error rate;
4 and
a calculator for calculating a forward link power control set point in
6 accordance with the selected signal bit error rate.

13. The apparatus of Claim 12 wherein the calculator for calculating
2 the selected signal bit error rate, comprises:

a selected signal symbol demodulator for demodulating received
4 selected signal symbols; and
a comparator for comparing the demodulated selected signal symbols to
6 a predetermined symbol sequence.

14. The apparatus of Claim 12 wherein the calculator for calculating
2 the selected signal bit error rate, further comprises:

a channel analyzer for determining at least one channel characteristic;
4 and
a power control set point calculator for calculating the forward link
6 power control set point in accordance with the selected signal bit error rate and
the at least one channel characteristic.

15. The apparatus of Claim 12 wherein the selected signal
2 demodulator comprises:

a channel estimator for generating a channel estimate in accordance with
4 the received selected signal symbols; and

a dot product circuit for computing the dot product between the channel
6 estimate and the received selected signal symbols.

16. The apparatus of Claim 15 wherein the channel estimator
2 comprises:

a Walsh summer for accumulating a predetermined number of selected
4 signal symbols; and

a selected signal filter for low pass filtering the accumulated selected
6 signal symbols.

17. The apparatus of Claim 11 wherein the selected signal
2 demodulator comprises:

a complex PN demodulator for demodulating the received signal in
4 accordance with a complex PN despreading format;

a despreading means for despreading the complex PN demodulated
6 selected signal;

a channel estimator for despreading the complex PN demodulated
8 signal and for filtering the despread signal; and

a dot product circuit for computing the dot product of the despread
10 signal and the channel estimate to provide the demodulated selected signal
symbols.

18. The apparatus of Claim 13 wherein the selected symbol
2 demodulator comprises:

a plurality of selected signal demodulators wherein each of the plurality
4 of selected signal demodulators demodulates a corresponding finger of a
diversity receiver to provide selected signal symbol energies; and

6 a combiner for receiving the selected signal symbol energies and for
combining the selected signal symbol energies.

19. The apparatus of Claim 12 wherein the apparatus for determining
2 the forward link power control set point, further comprises:

a signal variance calculator for determining the selected signal variance;

4 and

wherein the apparatus for determining the forward link power control
6 set point performs the determination in accordance with the selected signal
variance.

20. The apparatus of Claim 19 wherein the signal variance calculator
2 for determining the selected signal variance comprises:

a selected signal symbol energy calculator for computing energies of the
4 demodulated selected signal symbols; and

a variance calculator for calculating the variance of the energies of the
6 selected signal symbols.

21. The apparatus of Claim 19 wherein the signal variance calculator
2 for determining the selected signal variance comprises:

a plurality of selected signal symbol energy calculators wherein each of
4 the selected signal symbol energy calculators computes energies of the
demodulated selected signal symbols of a corresponding finger of a diversity
6 receiver;

a combiner for combining the energies of the selected signal symbols;
8 and

a variance calculator for calculating the variance of the combined
10 energies of the demodulated selected signal symbols.

22. The apparatus of Claim 20 wherein the variance calculator
2 comprises:

a first filter for receiving the demodulated selected signal symbol
4 energies and for filtering the selected signal symbol energies;

- 6 a first squaring multiplier for receiving the filtered demodulated selected
signal symbol energy and squaring the filtered demodulated selected symbol
energy to provide an average squared selected symbol energy;
- 8 a second squaring multiplier for receiving the demodulated selected
signal symbol energies and squaring the selected signal symbol energies;
- 10 a second filter for receiving the squared demodulated selected signal
symbols to provide a squared average selected signal symbol energy;
- 12 a summer for receiving the average squared selected symbol energy and
the squared average selected signal symbol energy and for summing the
14 average squared selected signal symbol energy and the squared average
selected signal symbol energy; and
- 16 a divider for receiving the sum of the average squared selected signal
symbol energy and the squared average selected symbol energy and for
18 receiving the average squared selected signal symbol energy and for dividing
the sum of the average squared selected signal symbol energy and the squared
20 average selected symbol energy by the average squared selected signal symbol
energy.

23. The apparatus of Claim 19 wherein the calculator for calculating
2 the forward link power control set point calculates the set point in accordance
with a linear combination of the selected signal variance and a selected signal
4 symbol error rate.

24. The apparatus of Claim 19 wherein the apparatus for determining
2 the forward link power control set point further comprises:
a lock detector for computing an average number of fingers in lock; and
4 wherein the apparatus for calculating the forward link power control set
point performs the calculation in accordance with the average number of
6 fingers in lock.

25. In a first communication device in which at least two forward link
2 channels are transmitted and in which a first forward link channel is
transmitted during a larger percentage of the duration of a communication
4 service than the remaining forward link channels, a method for determining the
forward link power control set point at a receiver of the at least two channels,
6 comprising:

- demodulating the first forward link channel of a received signal;
- 8 demodulating the remaining forward link channels of the received
signal; and
- 10 determining the forward link power control set point in accordance with
the demodulated first forward link channel.

26. The method of Claim 25 wherein the first forward link channel is
2 a forward power control sub-channel.

27. The method of Claim 25 wherein the remaining forward link
2 channels comprise a forward fundamental transmission channel.

28. The method of Claim 25 wherein the remaining forward link
2 channels comprise a forward dedicated control transmission channel.

29. The method of Claim 25 wherein the first communication device
2 is a base station and wherein the second communication device is a subscriber
unit.

30. The method of Claim 25 wherein determining the forward link
2 power control set point, comprises:

- calculating a selected signal bit error rate; and
- 4 calculating the power control set point in accordance with the selected
signal bit error rate.

31. The method of Claim 30 wherein calculating the selected signal
2 bit error rate, comprises:
demodulating received selected signal symbols; and
4 comparing the demodulated selected signal symbols to a predetermined
selected signal symbol sequence.

32. The method of Claim 30 wherein calculating the selected signal
2 bit error rate, further comprises:
determining at least one channel characteristic; and
4 wherein calculating the forward link power control set point calculates
the forward link power control set point in accordance with the selected signal
6 bit error rate and the at least one channel characteristic.

33. The method of Claim 32 wherein the at least one forward link
2 channel characteristic comprises the relative velocity between the first
communication device and the second communication device.

34. The method of Claim 31 wherein the demodulating the selected
2 signal symbols, comprises:
generating a channel estimate in accordance with the received selected
4 signal symbols; and
computing the dot product between channel the estimate and the
6 received selected signal symbols.

35. The method of Claim 34 wherein the generating a channel
2 estimate comprises:
accumulating a predetermined number of selected signal symbols; and
4 low pass filtering the accumulated selected signal symbols.

36. The method of Claim 34 wherein the demodulating selected
2 signal symbols, comprises:

- demodulating the received signal in accordance with a complex PN
- 4 despreading format;
- despreading the complex PN demodulated signal;
- 6 despreading the complex PN demodulated signal and for filtering the despread signal; and
- 8 computing the dot product of the despread signal and the channel estimate to provide the demodulated selected signal symbols.

37. The method of Claim 34 wherein the demodulating the selected
- 2 signal symbols, comprises:
- demodulating a plurality of selected signals wherein each of the
- 4 plurality of selected signals corresponds to a finger of a diversity receiver; and
- combining the selected signal symbol energies generated from
- 6 demodulating.

38. The method of Claim 33 wherein determining the forward link
- 2 power control set point, further comprises:
- determining a selected signal variance; and
- 4 wherein calculating the forward link power control set point comprises performing the calculation in accordance with the selected signal variance.

39. The method of Claim 38 wherein determining the selected signal
- 2 variance comprises:
- computing energies of the demodulated selected signal symbols; and
- 4 calculating the variance of the energies of the demodulated selected signal symbols.

40. The method of Claim 38 wherein determining the selected signal
- 2 variance comprises:

- computing a plurality of selected signal symbol energies wherein each of
- 4 the selected signal symbol energies corresponds to a finger of a diversity receiver;
- 6 combining the energies of the selected signal symbols; and
- calculating the variance of the combined energies of the demodulated
- 8 selected signal symbols.

41. The method of Claim 40 wherein calculating the variance of the
- 2 combined energies comprises:
- filtering the selected signal symbol energies;
- 4 squaring the filtered demodulated selected signal symbol energy to provide an average squared selected signal symbol energy;
- 6 squaring the selected symbol energies;
- filtering the squared demodulated selected signal symbols to provide a
- 8 squared average selected signal symbol energy;
- summing the average squared selected signal symbol energy and the
- 10 squared average selected signal symbol energy; and
- dividing the sum of the average squared selected signal symbol energy
- 12 and the squared average selected signal symbol energy by the average squared selected signal symbol energy.